object for which it was installed, which was to determine "the times at which various phases of motion are recorded" (see British Association Reports, 1897, p. 130. Copy of a circular sent to foreign Governments and colonies). This it does, and a little more. If an observer desires to have an open diagram, he must employ clockwork to drive the record receiving surface at a higher speed, whilst a longer period than the one usually employed can be obtained by adjustment. It must, however, be remembered that the period obtained at one station may, on account of the wandering of the pendulum and "tremors," be unpractical at another, and that difference in adjustment at different stations destroys uniformity. Although with the object of stimulating further research we have criticised certain portions of the work before us, the bulk of it commands the admiration and thanks of all seismologists.

THE GILBERT TERCENTENARY.

THE tenth of this month was the three hundredth anniversary of the death of Dr. William Gilbert, the celebrated Elizabethan philosopher who laid the foundations of the science of electricity. The occasion was celebrated on Thursday, December 10, at the meeting of the Institution of Electrical Engineers by the presentation of a picture by the Institution to the town of Colchester, in which place Gilbert was born and died. The picture was painted by Mr. Ackland Hood; it is a fine historical painting representing Dr. Gilbert showing his electrical experiments to Queen Elizabeth.

The proceedings were opened by the president of the Institution with a short speech. Prof. S. P. Thompson then gave a brief address, in which he outlined Gilbert's life and his contributions to science. Gilbert was born in Colchester in 1544, and was educated at the school there and subsequently at St. John's College, Cambridge, at which he became mathematical examiner and senior bursar. He took the degree of M.D. in 1569, and rapidly advanced in the profession, becoming in 1599 president of the Royal College of Physicians, and a year later physician to the Queen. He died at Colchester on December 10, 1603, and was buried there in the Church of Holy Trinity. Eminent as he was as a physician, his claim to immortality rests not on his work in medicine, but on his pioneering investigation in the then almost non-existing sciences of magnetism and electricity. To him we owe the science of terrestrial magnetism; by numerous and careful experiments upon the loadstone he discovered many of the most important principles of magnetism, such as the existence of a magnetic field—an "orbe of virtue"—around the magnet, the screening effect of iron, and the destroying effect of heat. From experiments on a globular loadstone he was able to evolve the theory that the earth is itself a great magnet. Thus many years before Bacon, who is usually regarded as the father of the inductive method, Gilbert was using this method with signal success.

Gilbert's contributions to electricity are contained in the second chapter of Book ii. of the celebrated "De Magnete." He showed that not amber alone, but many other bodies, which he put in a class called *electrics*, can attract solid bodies when rubbed; that they attract everything, not merely straws or chaff; that damp weather hinders the electrification; and that a flame destroys it, as well as many other important facts which are now the fundamental principles of the science. He invented the electroscope, and discovered that the force of attraction is in a straight line towards the electrified body. From these simple beginnings has been gradually evolved in 300 years the immense structure of pure and applied electricity.

The Mayor of Colchester thanked the Institution for its gift in a brief and humorous speech. Amongst many other distinguished men present at the meeting were Sir W. Huggins, president of the Royal Society; Sir Dyce Duckworth, treasurer of the Royal College of Physicians, an office twice held by Dr. Gilbert; Prof. J. Larmor, representing St. John's College, Cambridge; the Mayor of Westminster; and Mr. Ackland Hood, the painter of the picture.

AGRICULTURAL NOTES.

THE third report on the Woburn Experimental Fruit Farm, recently issued by the Duke of Bedford and Mr. Spencer Pickering, F.R.S., is devoted to a discussion of the effects of grass on apple trees. In previous reports it was shown that grasses prove most injurious to young apple trees, and the experiments described here were designed to throw light on the causes of injury. Up to the present time the cause, or causes, have not been discovered, but the experimenters have made considerable progress, for they have shown that their first suspicions were unfounded. Grasses might reasonably be expected to injure young fruit trees by interfering with their air, or water, or food supply, but the careful experiments recorded in the report indicate that interference with air, water, and food has little or nothing to do with the question, and that the injury "must, in all probability, be attributed to the action of some product, direct or indirect, of grass growth which exercises an actively poisonous effect on the roots of the tree." This conclusion is based partly on the negative evidence of the experiments, in which the supplies of food, air, and water were controlled, and partly on the appearance of the trees grown in grass. These trees were always very sharply marked off from the others by peculiar tints of leaf and fruit, quite unlike those due to starvation, and produced obviously by some unhealthy condition of soil. The effects of grass on apple trees have been studied only on the shallow clay soil of the Woburn Fruit Farm and on a clay soil at Harpenden, and it is possible, as the experimenters are careful to point out, that on a richer soil, and in a different climate, grass might not prove injurious, but the Woburn experiments clearly indicate that horticulturists should avoid planting apples in grass, unless there is local evidence that grass does not injure the young trees.

In their work on apple trees the Duke of Bedford and Mr. Pickering are dealing with a special and well-marked case of a general problem of great interest to agriculturists—the effects of crops and of crop residues on the quality of soil. Every observant cultivator knows that land may get "sick" or "over-cropped" when a plant is grown too often, and he also finds that certain plants "exhaust" the soil in a peculiar degree for certain other plants. He has been told that this is a "food" or a "special food" question, and that interference with the air, food, and water supply explains all the ills which plants may suffer from competition with their fellows. At the same time, he does not feel satisfied that such phenomena as the disappearance of clover from land, or the effects of rye-grass on wheat are due to straightforward competition, and the "poison" theory of the Woburn experimenters will arrest his attention. Seventy years ago agriculturists were discussing De Candolle's "excretory theory," and found in it the chief explanation of the benefits due to a rotation of crops; when the theory was abandoned the facts from which it originated were forgotten, and in connection with the effects of grass roots on apple trees the following sentence from De Candolle is worth recalling:—"Thus we know that the thistle is injurious to oats, the Euphorbia and Scabiosa to flax, the *Inula betulina* to the carrot, the *Erigeron acre* and tares to wheat, &c." Though the plant does not "excrete," it may readily influence the character and condition of the soil either directly by the decomposition of its roots, or indirectly through its effect on soil organisms, and the Woburn experiments, which deal with this subject, will be closely followed.

In a paper entitled "Recherches sur la Synthèse des Substances Albuminoïdes par les Végétaux," MM. Laurent and Marchal, of the State Agricultural Institute, Gembloux, give a useful *résumé* of the sources of nitrogen to plants. In doing so they point out that during the latter half of the nineteenth century there was a tendency to overlook the importance of ammoniacal compounds, and to regard nitrates as the only sources of nitrogen to the higher plants. While nitrates are of chief importance, there are many plants, even colonies of plants, such as forest trees and the vegetation of marshes, that must depend largely or entirely on compounds of ammonia for the supply of nitrogen. The authors describe experiments on cress, white mustard, chicory, asparagus, white melilot, Persian lilac, and tobacco, and among other conclusions state that sun-

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light is necessary for the synthesis of albuminoids in the higher green plants, and probably in all green plants, but that amides are produced in limited quantities in darkness and in parts of the plants which contain no chlorophyll. The lower plants devoid of chlorophyll can manufacture albuminoids in darkness, the necessary energy in this case being derived from the decomposition of organic compounds.

The twenty-third volume of the *Agricultural Journal* of the Cape of Good Hope is now being published in monthly parts by the Department of Agriculture, Cape Town. Though not new, the *Journal* has recently altered and improved its form, and this sixpenny monthly may be commended to the notice of all who are interested in the agriculture of South Africa. Prospective settlers would find many useful hints in it, for by means of editorial notes, special articles, and correspondence the *Journal* gives a clear presentation of the condition of the various farming industries of Cape Colony. Diseases of live stock are very common in the colony, and young men preparing for life on a South African farm should endeavour to gain some knowledge of veterinary hygiene before going abroad. The *Journal* usually devotes one or two articles in each number to veterinary subjects and the ailments of stock bulk largely in the correspondence columns. A correspondent from Aliwal North, writing in the October number, makes an observation which is interesting in view of the importance of ticks as carriers of disease germs. He reports that he had a flock of goats badly infected, but "happened to drop" on a cure in the shape of wild garlic. He gave the affected animals a small quantity; the ticks were not killed, but they dropped off the goats, and no further loss was suffered. Next year, when the tick season came round, the goats escaped injury.

Regulations for the purpose of preventing the importation of plant pests have been in force in Cape Colony for a number of years, but experience has shown greater caution to be necessary, and after January 1, 1904, new and stringent regulations will come into force. With the view of preventing inconvenience and loss to exporters, wide publication has been given to the altered regulations. The following points are of special interest to horticulturists:—(1) All plants or parts of plants not grown in South Africa must in future be sent to Cape Colony by sea. Imported plants must not be sent overland from other colonies. (2) Certain plants are absolutely prohibited, as, for example, stone-fruits from the U.S.A. and Canada, and peaches from any foreign country. (3) Permits are granted for the importation of small quantities of fruit trees from most countries, so that stocks of new varieties may be worked up in the colony. (4) Plants will be examined on landing by a competent officer, thus minimising the risk of importing pests. Trees and woody plants will be fumigated, the expense of fumigation being borne by the consignee. Any plants or parts of plants on which the examining officer finds a specially dangerous pest will be destroyed without delay.

BUDDHISM.[1]

THE appearance of the first number of a new quarterly magazine entitled *Buddhism* is an event of some significance, for it argues that the modern tendency of western inquiry into the ethics of this ancient eastern faith is sufficiently active to justify a commercial venture.

The object of the review is stated to be, first, to set before the world the true principles of the Buddhist religion; secondly, to promote certain humanitarian activities enjoined by Buddhist precept; and, thirdly, to unite, "as by a common bond of mutual interest and brotherhood, the many associations with Buddhist aims which now exist."

These objects are well sustained in the initial number of the review. It opens, most appropriately, with a poem by Sir Edwin Arnold, whose "Light of Asia" has probably done more to popularise Buddhism in the west than any literary effort hitherto known. It continues with a series of essays by Buddhist writers, in which the doctrines of Buddhism are explained and advocated with much earnestness, and, on the whole, with an intelligent appreciation of the limitations of ordinary human understanding; and it includes notes and references which sufficiently prove what an active agency in the practical world Buddhism is becoming. Amongst the notes is an invitation to western students to join the great brotherhood of the Yellow Robe, with a very explicit statement of the conditions under which candidates will be accepted. "Bhikkus of occidental nationalities" are first invited, "who in due time would be able to return to their own countries, there to spread the knowledge of Buddhism"—in short, missionaries. Amongst these Bhikkus there may be some who may be willing to take the Robe, but they are candidly warned that the conditions of life in the order are "somewhat severe for occidentals."

All this is practical business, and it leaves an impression that the review fills a space in the ranks of modern Oriental literature which is distinctly open to enterprise.

The article on the "Faith of the Future," coupled with that on "Nibbana" (Nirvana), is a clear and intelligible exposition of the gospel of law and self-culture inculcated by Buddhism, and is, perhaps, a clearer analysis of the final conditions of nebulous existence which crowns and completes the strenuous life of the Buddhist than can be found in most theological treatises on the Christian's hereafter. Based on the unsafe assumption that the "destructive fire of science" has annihilated revealed religion, it offers the alternative of the old world ethical system which is not founded on revelation at all—"the system of ontology founded on reason rather than belief"—which advocates the culture of the highest faculties of the mind; and teaches man that, avoiding all vain speculations about God and the soul, or his future self-conscious identity, he should concentrate his attention on existence as he finds it, and learn that all evil springs, not from the life without, but from the heart within, its cravings and its desires. "The attainment of true and lasting happiness is for him alone who from his own being shall eradicate the Cause of Sorrow, shall free his heart from all this grasping at straws in life's fierce waters, and from all this thirst after its false salt waves. And the way in which this may be done . . . is Truth the Fourth," &c.

The writer of the essay would do well to avoid overstating his case. It is not the fact that Buddhism has done more towards civilising the world than any other religion, nor can the proposition be unconditionally accepted that it has added more towards increasing the great sum of human happiness and peace than any other; for it is an indisputable fact that in this imperfect world (so slowly developing towards more perfect ends through the agency, not of one, but of all reasonable religions) war has, after all, been the great civilising agent, the cleansing and purifying principle which has age after age reconstructed higher forms of civilised existence on the ashes of destroyed communities. And war is wholly and absolutely obnoxious to Buddhist principles. As for the peaceful and happy conditions of such nations of the world as still recognise the gentle rule of the Buddhist priest, we may still be open to serious doubt. The Burmese, truly, are a light-hearted race—but is this due to self-culture, or environment? In Ceylon, alas! virulent family dissensions ending in crime are (or were but a few years ago) peculiarly frequent.

It is, however, impossible to do more than note the general character of the review. It is well written (there are two delightfully descriptive articles on "The Woman of Burma" and the "Shadow of the Shwe Dagon"), well printed, and well illustrated, and will do much to familiarise the European reader with the active principles of an eastern faith which is older than Christianity, and is professed by 500 millions of his human contemporaries. In the modern world of free thought and toleration such a magazine as this should be welcome, and it would not be surprising if it attained a wide circulation.

TECHNICAL EDUCATION IN GERMANY.

THE excellence of the German system of higher scientific and technical education has been referred to in many articles which have already appeared in NATURE, and the lavish endowment by the State in Germany of the institutions in which the education is given was dealt with in our issue for March 12 (vol. lxvii. p. 433). We are glad to find that public attention is being again directed to the same subject by the *Times*, and that an exhaustive comparison

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[1] *Buddhism*, an Illustrated Quarterly Review. (Printed and published for the International Buddhist Society by the Hantnawaddy Printing Works, Rangoon, Burma.)

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